REMARKS

Claims 1-47 remain in the application. This response is necessary and not earlier presented in order to respond to the new grounds for rejection provided by the Examiner is the Final Office Action. Entry of this response is respectfully requested. Further examination and reconsideration of the application, as previously amended, is hereby requested.

On page 2 of the Final Action, the Examiner rejected claims 1-10 under 35 USC 103(a) as being unpatentable over Chuman in view of Nakatani. Applicants respectfully traverse this rejection for the reasons stated in the previous response to the prior Office Action.

In regard to the Examiner's statement that the "electron supply, dielectric layer and cathode layer being subjected to an annealing process" is a "product by process claim," the inventors have previously provided evidence of how the process creates a new structure that is not disclose, taught, or suggested by Chuman or Nakatani alone or in combination. The Applicants have provided evidence of this new structure and *thus have overcome the burden of proof* necessary as required by in re Spada, 911 F.2d 705, 709, 15 USPQ.2D 1655 (Fed. Cir. 1990), *to reasonably show that their claimed combination is different* from that described by the prior art. The nano-porous openings in the cathode layer are not disclosed in Chuman nor are they disclosed in Nakatani. In fact, Chuman discloses a flat tunneling emitter and Nakatani discloses emitters using field emission tips. There is no motivation in Chuman or Nakatani to subject the emitter of Chuman to "an annealing process to create nano-porous openings in the cathode layer" as Applicants are claiming in claim 1. Accordingly, claim 1 is believed patentable over the art made of record and is deemed in prima facie condition for allowance.

Claims 2-3 depend upon claim 1 and are believed patentable based at least on the patentability of claim 1. Claims 2-3 are deemed in prima facie condition for allowance.

With regard to claims 4-6, the Examiner asserts that since Chuman discloses an emission current with a max current of 10^{-3} Amps per sq. cm. that it

would have been obvious to one of ordinary skill at the time the invention was made to have the emission current greater than 10^{-3} Amps per sq. cm. Applicants respectfully traverse this assertion. The Examiner has not stated how one of ordinary skill would increase the output of Chuman. As Chuman's output is expressed in terms of current per area, simply making the emitter bigger would not increase the output in terms of Amps per sq. cm. The Applicants believe the Examiner's assertion is a mere conclusion without factual evidence or reason. Conversely, by providing for nano-porous openings in the cathode layer, the Applicants have demonstrated both by reason and experimental results a current density greater than 10^{-3} Amps per sq. cm. and indeed by over an order of magnitude (a factor of 10X). Applicants respectfully request that the Examiner provide an affidavit or supply a reference that reasons or demonstrates how Chuman would be obviously modified to create an emission current greater than 10^{-3} Amps per sq. cm. Applicants believe that claims 4-6 are patentable based at least on the patentability of claim 1 and thus are deemed in prima facie condition for allowance.

Claims 7-10 are dependent upon claim 1 and are believed patentable based at least on the patentability of claim 1. Claims 7-10 are deemed in prima facie condition for allowance.

On page 4 of the Final Action, the Examiner rejected claims 11, 13, and 14 under 35 USC 103(a) as being unpatentable over Chuman, Nakatani in view of Xia. Claims 11, 13, and 14 depend directly or indirectly on claim 1 and are believed patentable based at least on the patentability of claim 1. Claims 11, 13, and 14 are deemed in prima facie condition for allowance.

On page 4 of the Final Action, the Examiner rejected claim 12 under 35 USC 103(a) as being unpatentable over Chuman, Nakatani and Xia in view of Gibson. Claim 12 depends upon claim 11 and indirectly on claim 1 and is believed patentable based at least on the patentability of claim 1. Claim 12 is deemed in prima facie condition for allowance.

On page 5 of the Final Action, the Examiner rejected claims 15 and 16 under 35 USC 103(a) as being unpatentable over Chuman in view of Gibson. Applicants respectfully traverse this rejection. Claim 15 includes the limitation of "at least one emitter subjected to an annealing process to create nano-porous openings in the cathode layer" similar to that in claim 1. Accordingly, the annealing process creates a novel structure in that the cathode layer has "nano-porous" openings which allow for larger emission currents and longer life. These "nano-porous openings" are not disclosed, taught, or suggested by Chuman or Gibson alone or in combination. Applicants believe that they have overcome the burden of proof required by in re Spada by providing a reasonable presentation of why the structure of their emitter device is different from that described by Chuman. Accordingly, Claim 15 is believed patentable over the art made of record. Claim 16 is dependent upon claim 15 is believed patentable based on the patentability of claim 15. Claims 15 and 16 are deemed in prima facie condition for allowance.

On page 7 of the Final Action, the Examiner rejected claims 17-23 and 25 under 35 USC 103(a) as being unpatentable over Chuman in view of Moyer and Nakatani. Applicants respectfully traverse this rejection for the reasons previously stated for claims 1 and 15. Claim 17 includes the limitation of the emitter "subjected to an annealing process to create nano-porous openings in the cathode layer." Applicants believe that they have overcome the burden of proof required by in re Spada by providing a reasonable presentation of why the structure of their emitter device is different from that described by Chuman, Moyer and Nakatani. Nor does any combination of Chuman, Moyer, or Nakatani create Applicants claimed invention. Chuman does not describe, teach, or suggest "nano-hole openings." Moyer removes the cathode layer to create a large aperture 37 in contact layer 35 and aperture 41 in conductive layer 40 used as an extraction gate to change the electric fields to create the field shape shown in Fig. 4. On the other hand, Applicants have used nano-hole openings in a cathode layer to provide a fairly uniform electric field across the surface of the emitter to prevent the large drop in electric field shown in Fig. 2 of Moyer for a non-nano-porous opening used in prior art devices. Accordingly, Moyer does not teach or suggest "nano-hole openings." Nakatani disclosed field tip emitters which operate

on a different principle than tunneling emitters and thus does not disclose, teach, or suggest Applicants claimed invention. Accordingly, claim 17 is believed patentable over the art made of record and is deemed to be in prima facie condition for allowance.

Claims 18-23 and 25 depend upon claim 17 and are believe patentable based at least on the patentability of claim 17. Further, these claims contain additional limitations making them separately patentable over the art made of record, some of which will now be discussed. Claim 18 includes the limitation of the emitter being capable of "emitting photons in addition to the electron emission." This limitation is not disclosed, taught, or suggested by the art alone or in combination. While Nakatani discloses an emitter that emits electrons to strike a luminous surface which then emits light, Nakatani does not disclose the emitter "emitting photons in addition to the electron emission" as Applicants are claiming. It is the unique combination of the tunneling material and nano-porous openings that allow the emitter itself to create both photons and electrons. Accordingly, claim 18 is believe separately patentable. Claim 19 is believe separately patentable for the reasons stated for claims 4-6 above. Claims 19-23 and 25 are deemed in prima facie condition for allowance.

On page 9 of the Final Action, the Examiner rejected claim 24 under 35 USC 103(a) as being unpatentable over Chuman, Moyer, and Nakatani as applied to claim 17 and further in view of Gibson. Claim 24 depends upon claim 17 is believed patentable based at least on the patentability of claim 17. Claim 24 is deemed in prima facie condition for allowance.

On page 10 of the Final Action, the Examiner rejected claims 26-28 under 35 USC 103(a) as being unpatentable over Chuman, Moyer, and Nakatani as applied to claims 17 and 25 and further in view of Xia. Claims 26-28 depend upon claim 17 indirectly and are believed patentable based at least on the patentability of claim 17. Claims 26-28 are deemed in prima facie condition for allowance.

On page 10 of the Final Action, the Examiner rejected claims 29-47 under 35 USC 103(a) as being unpatentable over Chuman, Moyer and Huang. Applicants respectfully traverse this rejection for the reasons stated above with respect to claims 1 and 17. Claim 29 claims "a cathode layer" being "an electron-emitting surface having nano-porous openings." This limitation is not disclosed, taught, or suggested by Chuman, Moyer, or Huang. Chuman discloses a flat tunneling emitter with a solid cathode surface. Moyer discloses a flat emitter with an opening over the entire cathode surface. Huang discloses a tip emitter with a diamond coating 50 on the emitter tip. None of these references alone or in combination disclose, teach, or suggest Applicants' claimed invention wherein the "cathode layer is an electron-emitting surface having nano-porous openings." Accordingly, claim 29 is believed patentable over the art made of record and is deemed in prima facie condition for allowance.

Claims 30-35 depend upon claim 29 and are believed patentable based at least on the patentability of claim 29. Claim 30 is believed separately patentable for the reasons discussed above with respect to claims 4-6. Claim 35 is believed separately patentable based on the reasons discussed above for claim 18. Claims 30-35 are deemed in prima facie condition for allowance.

Claim 36 includes the limitation of "an emitting surface having a first area and nano-porous openings." This limitation is not disclosed, taught, or suggested by Chuman, Moyer, or Huang as discussed for claims 1, 15, 17, and 29. Claim 36 is deemed in prima facie condition for allowance.

Claims 37-42 depend on claim 36 and are believed patentable based at least on the patentability of claim 36. Claims 37-42 are believed in prima facie condition for allowance.

Claim 43 includes the limitation of "the cathode layer having nano-porous openings." This limitation is not disclosed, taught, or suggested by Chuman, Moyer, or Huang as discussed for claims 1, 15, 17, and 29. Claim 43 is deemed in prima facie condition for allowance.

Claims 44-47 on claim 43 and are believed patentable based at least on the patentability of claim 43. Claims 44-47 are believed in prima facie condition for allowance.

Applicants believe claims 1-47 as amended previously are in *prima facie* condition for allowance, and such allowance is respectfully requested. Should the Examiner believe otherwise, the Examiner is encouraged to promptly contact Applicants' representative at the phone number listed below to discuss the Examiner's concerns so that they can be addressed in a timely manner. At a minimum, Applicants hereby request a promptly issued Advisory Action indicating the entry of this response to simplify issues for appeal..

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